



CLAIMS of
ULTRA HIGH RESOLUTION RADAR
WITH ACTIVE ELECTRONICALLY SCANNED ANTENNA (AESA)

What we claim is:

1. An ultra-high resolution radar with flat or conformal transmit/receive AESA or AESAs steering beam or beams non-dispersively, comprising:

a waveform signal generator/generators which generates a train of designated forms of voltage pulse signals with a designated repetition times, said voltage pulse signal duration is at least longer than the required duration of the AESA transmitting or receiving pulse signals;

a means for creating a plurality of RF FM modulated pulse signals of identical shape and duration but different consecutive magnitude comprising a resistive multiport voltage divider/dividers electrically connected to said waveform generator/generators, said resistive multiport voltage divider/dividers providing plurality of said voltage pulse signals, a plurality of VCOs electrically connected to said resistive multiport voltage divider/dividers, a plurality of mixers electrically connected to VCRs, STALO or any other narrow-band or wide-band source of RF signals , and to a plurality of radiating elements in order to generate signals providing simultaneously the required beam or beams azimuth and elevation steering electronically and transmitting pulse signals to illuminate radar targets;

a means for generating said transmitting pulse signals which phase and power spectrum depends on azimuth and elevation angles comprising a resistive multiport voltage

divider/dividers electrically connected to said waveform generator/generators, said resistive multiport voltage divider/dividers providing plurality of said voltage pulse signals, a plurality of VCOs electrically connected to said resistive multiport voltage divider/dividers, a plurality of mixers electrically connected to VCRs, STALO or any other narrow-band or wide-band source of RF signals , and to a plurality of radiating elements in order to generate signals providing simultaneously the required beam or beams azimuth and elevation steering electronically and transmitting pulse signals to illuminate radar targets;

a transmit/receive flat or conformal AESA comprising plurality of said radiating elements uniform or nonuniform spaced, said radiating elements uniform or nonuniform excited to transmit and collect propagating electromagnetic energy which are excited or collect energy such a way that the bottom left or bottom right radiation element of AESA radiates or receives a nonmodulated carrier signal.

2. An ultra-high resolution radar with transmit/receive AESA or AESAs steering beam or beams non-dispersively, comprising:

a waveform signal generator/generators which generates a train of designated forms of voltage pulse signals with a designated repetition times, said voltage pulse signal duration is at least longer than the required duration of the AESA receiving pulse signals;

a means for creating a plurality of RF FM modulated pulse signals of identical shape and duration but different consecutive magnitude comprising a resistive multiport voltage divider/dividers electrically connected to said waveform generator/generators, said resistive multiport voltage divider/dividers providing plurality of said voltage pulse signals, a plurality of VCOs electrically connected to said resistive multiport voltage divider/dividers, a plurality of mixers electrically connected to VCRs, STALO or any other

narrow-band or wide-band source of RF signals , and to a plurality of radiating elements in order to generate signals providing simultaneously the required beam or beams azimuth and elevation steering electronically and receiving target-echo return pulse signals;

a means for creating and combining the receiving signals which is electrically connected to plurality of LNAs amplifying said target-echo return signals those are received by a plurality of said radiating elements comprising a plurality of mixers electrically connected to said LNA outputs, a power combiner/combiners, and a plurality of said mixers creating said FM signals for transmitting part of said radar;

3. An ultra-high resolution radar with transmit/receive AESA or AESAs steering beam or beams non-dispersively, comprising:

a waveform signal generator/generators which generates a train of designated forms of voltage pulse signals with a designated repetition times, said voltage pulse signal duration is at least longer than the required duration of the AESA receiving pulse signals;

a means for creating a plurality of RF FM modulated pulse signals of identical shape and duration but different consecutive magnitude comprising a resistive multiport voltage divider/dividers electrically connected to said waveform generator/generators, said resistive multiport voltage divider/dividers providing plurality of said voltage pulse signals, a plurality of VCOs electrically connected to said resistive multiport voltage divider/dividers, a plurality of mixers electrically connected to VCRs, STALO or any other narrow-band or wide-band source of RF signals, and to a plurality of radiating elements in order to generate signals providing simultaneously the required beam or beams azimuth and elevation steering electronically and receiving target-echo return signals;

a means for producing the receiving signals which is electrically connected to plurality of LNAs amplifying the signals those are reflected from illuminated targets and received by a plurality of said radiating elements comprising a plurality of mixers electrically connected to said LNA outputs, a power combiner/combiners, and a plurality of said mixers creating said FM signals for transmitting part of said radar;

a means for processing target-echo return signals which is electrically connected to said receiving AESA or AESAs, said processing means being electrically connected with narrow band filters in order to enhance signal-to-noise ratio for detecting said target-echo return signals with said phase and power spectrum depending on angular target positions and range of a targets, and in order to get ultra-high angular and range resolution.